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Spillover Effects of Government Initiatives fostering Entrepreneurship on the Access to Bank Credit for Entrepreneurial Firms in Europe

Abstract

We explore the role of government initiatives fostering entrepreneurship—in the form of tax advantages and government support—in influencing the probability that entrepreneurial firms obtain bank credit and are not discouraged from applying for a loan. We propose that government initiatives fostering entrepreneurship should allow entrepreneurial firms to access more bank credit by reducing the risk incurred by lenders. We simultaneously estimate the probability of obtaining credit when a firm applies for a loan and the probability that the firm has been discouraged when it does not apply for a loan. In both cases we control for endogeneity. Our results are based on 18,872 observations (from the European Central Bank (ECB) SAFE dataset and Global Entrepreneurship Monitor – GEM) and show that government initiatives improve the probability of entrepreneurial firms obtaining bank credit but do not affect the probability of being discouraged from borrowing. The results also suggest that government initiatives fostering entrepreneurship are of most benefit to younger, smaller, high-growth, and more innovative firms that operate in contexts where the demand for, and accordingly the competition for, bank credit is strongest.

Keywords: *Credit Access, Government Initiative, Discouraged Borrowers, Entrepreneurship, Small and Medium Firms.*

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Introduction

The current research investigates the impact of government initiatives fostering entrepreneurship on entrepreneurial firms' access to bank finance. Access to finance is very important for every firm and even more so for entrepreneurial ventures (Block et al., 2018; Fraser et al., 2015)—characterized as firms that pursue rapid grow by leveraging innovative products, services, and processes (Shane and Venkataraman, 2000). Although it is often founding entrepreneurs, their friends, and family members who provide the financial support for the initial steps of venture creation (Berger and Udell, 2006; Voordeckers and Steijvers, 2006; Winborg and Landström, 2000; Fraser et al., 2015), additional external funds will usually be required to release the full potential of the venture through facilitating rapid and sustained growth (Berger and Udell, 1995; Cassar, 2004; Mason and Harrison, 1997; Petersen and Rajan, 1994). In fact, additional external funds foster entrepreneurial firms' development opportunities (Eckhardt et al., 2006), because they enable management to pursue more ambitious strategies and allow for greater leverage than would usually be possible for firms lacking access to external funding (Ang, 1992; Sogorb-Mira, 2005). From the equity point of view, entrepreneurs can access finance via venture capitalists and business angels (Timmons, 1999; Block et al., 2015; Fraser et al., 2015). These sources are widely discussed in the media and in the entrepreneurial finance literature (Denis, 2004). However, equity finance is not the only source of funds for entrepreneurial firms. Particularly, in the continental European context, banks are by far the most important source of funds for entrepreneurship (Heyman et al., 2008; Ortiz-Molina and Penas, 2008; Revest and Sapio, 2012). Accordingly, research on

entrepreneurial finance should refocus on entrepreneurial firms' access to bank finance (Elston and Audretsch, 2011; Garcia-Tabuenca and Crespo-Espert, 2010). Our research addresses this call.

We explore the role of two government initiatives for entrepreneurship: tax advantages (i.e., fiscal measures that allow the firm to retain a larger share of its profits than the tax regime would normally permit to finance growth and expansion) and government support (i.e., grants, funds offered at reduced interest rates, guarantees, etc.) for entrepreneurial firms seeking to access bank finance. Drawing on recent work by Cumming et al. (2018) on spillover effects of government initiatives, we formulate two hypotheses, each covering the two actor groups' perspectives on credit access. From the banks' perspective, we look at the probability that following their screening process, banks approve loan applications based on observable characteristics of the applicant firms and the government initiatives available to support them. From the entrepreneurial firms' perspective, we explore the probability that entrepreneurs will apply for a loan because they do not anticipate the bank rejecting the application because there are government initiatives available to support them; that is, that they are not discouraged borrowers (Bhaird et al., 2016; Freel et al., 2012).

To test our hypotheses on the impact of government initiatives, we simultaneously model the firms' and the banks' decisions using extended probit regressions (eprobit) that correct for both endogeneity of government initiatives and sample selection by taking into consideration that 1) banks can offer credit only to those firms that have applied for a loan, and that 2) discouraged borrowers can only be found among those firms that have not applied for a loan. Our estimations rely on the Survey on the Access to Finance of Enterprises (SAFE) conducted on behalf of the European Commission and the ECB. The dataset comprises 18,782 observations collected from entrepreneurial firms between spring 2013 and

autumn 2017. The SAFE database details about loan applications and lending decisions. To capture the level of government initiatives for entrepreneurship in the different European Union member states, we combine the SAFE data with data from the Global Entrepreneurship Monitor (GEM) conducted by Babson College (USA) and the London Business School (UK).

The findings suggest both tax advantage and entrepreneurship support programs have a positive effect on the probability of entrepreneurial firms obtaining bank credit. At the same time, our evidence suggests government initiatives fostering entrepreneurship have no effect on the probability of entrepreneurial firms becoming discouraged borrowers. In addition, we find that tax advantages and government support are relevant factors in increasing the probability of accessing credit in a zone with a high demand for credit (Eurozone countries) while they do not have such an effect in countries where there is a low demand for credit (non-Eurozone countries). That is because in the latter the reduced competition makes any reduction of risk associated with government initiatives less relevant to banks' credit decisions. We also find that the marginal effects are quite relevant (between 9% and 21% change in the probability of obtaining credit for 1% change in the GEM measure) and the economic benefit of these policies is greater for younger, smaller, innovative, high-growth firms.

Our research contributes to theory, practice, and policy. First, it contributes to current research on the role of governments in financial markets by suggesting that government initiatives can successfully address the undersupply of entrepreneurship caused by market failure in the financial markets (Cumming et al., 2018; Guerini and Quas, 2016). Second, the insight that government initiatives can effectively reduce the risk faced by small, young, innovative, rapidly growing firms so that banks are more likely to provide credit, is an important contribution to the ongoing discourse in the realm of entrepreneurial finance. Our

empirical results contribute to the discourse on spillover effects of one source of finance on other sources (Cumming et al., 2018) and expand it to initiatives undertaken by governments. Third, our findings indicate that entrepreneurs should consider the governmental initiatives offered and the competition for bank loans in different countries when selecting where to locate their firm. Fourth, for policy makers our findings can guide the design of initiatives to support entrepreneurship. Support programs proved more effective than tax advantages, because they are more focused, more selective, and have a signaling role (Cumming et al., 2018).

The manuscript is organized as follows: Section 2 explores the literature review and develops four hypotheses. Section 3 explains the data used and the methodological approach applied. Sections 4 and 5 respectively present the descriptive statistics and the results, while Section 6 discusses our evidence. Section 7 concludes.

2. Literature review and hypothesis development.

Entrepreneurial firms typically present a high risk for business partners in general and for the providers of funds, such as banks, in particular. That is largely due to four characteristics of such firms. First, entrepreneurial ventures are more opaque than established firms (Ang, 1992; Berger and Udell, 2002). This stems from their limited capability to produce and submit the documentation requested by the banks since they tend to suffer from the liability of smallness (Stinchcombe, 1965). Second, entrepreneurial firms may suffer from the liability of newness: typically they are new/young and, accordingly, lack a sufficiently long track record to assist financial institutions to evaluate their creditworthiness (Berger et al., 2014, 2001; Kashyap, 1998; Moro et al., 2015; Tsuruta, 2010; Zambaldi et al., 2011). Consequently, lenders face agency and moral hazard issues and have to rely on alternative lending techniques (Agarwal and Hauswald, 2008; Berger and Udell, 2006, 1995; Degryse

and Van Cayseele, 2000; Moro et al., 2015; Moro and Fink, 2013; Petersen and Rajan, 1994) that cannot necessarily resolve these issues. Third, the innovativeness of entrepreneurial ventures in terms of new products, services, and processes increases the uncertainty about their future performance (Kreiser et al., 2013; Oke et al., 2007; Rosenbusch et al., 2011). The greater innovativeness of entrepreneurial ventures and the intense pursuit of research and development (Piga and Atzeni, 2007) brings the risk that new products, services, and processes will not perform in the markets as forecast and will not be able to generate the anticipated cash flow needed to repay the principal and interest. Consequently, compared to firms with well-established markets, product/service lines, and processes, the uncertainty linked to the innovativeness of entrepreneurial firms carries an elevated risk for providers of funds. Fourth, while some research finds that bank debt is not the most relevant source of finance for these firms (Heyman et al., 2008), the majority of empirical evidence indicates that the high growth rates that characterize entrepreneurial firms are typically financed through bank loans (Ang, 1992; Ang et al., 1995; Huyghebaert et al., 2007). Accordingly, the capital structure of entrepreneurial firms is characterized by the large proportion of debt finance (greater financial leverage) that, in turn, increases the financial risk (Hui et al., 2010; La Rocca et al., 2011). Overall, the joint effect of these four characteristics is to increase the risk banks must account for when providing loans to entrepreneurial firms.

To mitigate the greater risk linked to lending, banks exploit different techniques ranging from the more formal (transaction lending) to the more informal (relationship lending) (Berger and Udell, 1995; Petersen and Rajan, 1995, 1994). However, these lending techniques can only partly compensate for the information asymmetry and the related agency issues faced by banks so that the difficulties faced by entrepreneurial firms in accessing bank credit cannot be overcome. However, the constrained access to additional funds can compromise entrepreneurial firms' ability to exploit their full growth potential (Beck and

Demirguc-Kunt, 2006). Overall, the issues new ventures face in raising the funds suggest a systematic disadvantage that results in a divergence between social and private costs. This divergence leads to less entrepreneurship in an economy than is socially desired (e.g., market failure, Lundström and Stevenson, 2005). Market failure (Rotger et al., 2012), curbs the potential for entrepreneurship to prompt innovation, job creation, growth, and structural change (Acs, 2006; Acs et al., 2018; Acs and Szerb, 2007; Baron and Tang, 2011; Timmons, 1999; Wong et al., 2005). The threat of market failure thus triggers calls for government initiatives to foster entrepreneurship (Cumming et al., 2018) to grant society access to the positive effects of individual entrepreneurial activity (Bertoni et al., 2019; Cumming and Li, 2013; Meuleman and De Maeseneire, 2012; Minniti, 2008)

Given the strong political argument for fostering entrepreneurship with taxpayers' money, it is no surprise that there are substantial initiatives supporting entrepreneurship across Europe; however, they differ in terms of both strategy and intensity so that in different countries initiatives come in different forms and on different scales (OECD, 2017, 2015). Lundström et al. (2014) provide a comprehensive picture of public spending on initiatives fostering entrepreneurship and find that in 2009 Sweden, Austria, and the Belgian region of Flanders spent 23, 21, and 21 euros per capita respectively, while Poland spent only five euros per capita.

We argue that government initiatives fostering entrepreneurship that mitigate the risks facing entrepreneurial ventures can be expected to have a positive spillover effect on entrepreneurial firms' access to bank finance by positively affecting banks' lending decisions (Berger and Udell, 2006; Garcia-Tabuenca and Crespo-Espert, 2010; Hanley and Girma, 2006; Cummings et al., 2018). The most common of such government initiatives are tax advantages (e.g., tax discounts and tax holidays) and government support (e.g., grants, guarantees, and funds). Both types of government initiative in support of entrepreneurship

tend to improve firm performance and thus reduce the economic risk entrepreneurs face in their venturing projects.

Forms of tax advantage governments might offer to foster entrepreneurship include tax holidays for start-ups that extend for the first few years after establishment; accelerated depreciation of new assets purchased so that the tax burden can be reduced; a tax discount or tax holiday for firms investing in research and development; and a tax discount for firms reinvesting their profits. These government initiatives reduce the risk associated with entrepreneurial activity in several ways. First, by allowing the firm to retain a greater proportion of its profit that can be reinvested in innovations and growth, entrepreneurial firms can reduce their dependence on debt finance. The reduction of financial risk associated with reduced leverage can facilitate entrepreneurial firms' access to credit when they require additional funds needed (Cressy, 2012; Romano et al., 2000). Second, an entrepreneurial firm having more cash available reassures banks that the firm will be able to repay any loans it takes out (Belghitar and Khan, 2013). Third, a tax advantage for entrepreneurial firms may increase the transparency and accuracy of the information generated. This happens because a greater tax burden may stimulate firms to implement accounting strategies that target tax reductions at the expense of the transparency and accuracy of their accounts (Guenther, 1994; Lin et al., 2012). Finally, entrepreneurial firms granted tax holidays should be able to reduce administrative costs because they have to spend less time on accounting and annual tax returns. Savings in administrative requirements allow for the allocation of extra resources to operations.

We expect that generous tax advantages for entrepreneurial firms would have positive spillover effects (Cummings et al, 2018) on banks' and firms managements' loan decisions. Banks may be more likely to provide loans to entrepreneurial firms backed by tax advantages because of the reduced financial risks, their increased liquidity, and owing to the enhanced

transparency and accuracy of their accounts. At the same time, the management of entrepreneurial firms should anticipate the reduced entrepreneurial risk flowing from generous tax advantages and reduced administrative requirements. Management should therefore be less concerned that banks will turn down their loan applications. In regions offering entrepreneurial firms generous tax advantages, entrepreneurs should be less likely to be discouraged from applying for a bank loan than those operating in areas with less advantageous tax regimes (Bhaird et al., 2016; Freel et al., 2012). To test these effects, we propose the following hypotheses.

Hypothesis 1a: The greater the tax advantage fostering entrepreneurship, the greater the probability that an entrepreneurial firm will obtain a loan from a bank if it applies for one.

Hypothesis 1b: The greater the tax advantage fostering entrepreneurship, the lower the probability that an entrepreneurial firm does not apply for a loan because its management was discouraged from applying for one.

Direct support measures for entrepreneurial firms available to government include financial support schemes in the form of guarantees to facilitate access to credit for firms unable to offer sufficient collateral; grants to support research and development or the launch of new products/services; loans at discounted interest rates; contributions to reduce the cost of bank loans, etc. (Garcia-Tabuenca and Crespo-Espert, 2010; Posey and Reichert, 2011; Zecchini and Ventura, 2009). The effect of these programs is to enhance the financial performance of entrepreneurial firms (Bertoni et al., 2019; Fraser et al., 2015): First, because government support enhances the certainty of cash flows that the firm will be able to

generate, banks are reassured about entrepreneurial firms' ability to pay the principal sum and interest; and second, government guarantees reduce banks' exposure to the risk of a loan default (Garcia-Tabuenca and Crespo-Espert, 2010). Accordingly, we expect that government providing strong support to entrepreneurial firms would spur positive spillover effects (Cumming et al., 2018) on banks' and firms managements' loan decisions. Banks should reflect the reduced risk of lending to enterprises supported by government programs by providing loans to those ventures; at the same time, the management of entrepreneurial firms should anticipate the reduced entrepreneurial risk and be less concerned that their firms will be refused loans by the banks. To test these effects, we propose the following hypotheses.

Hypothesis 2a: The stronger the government support for entrepreneurship, the greater the probability that an entrepreneurial firm will obtain a loan from a bank if it applies for one.

Hypothesis 2b: The stronger the government support for entrepreneurship, the lower will be the probability that an entrepreneurial firm does not apply for a loan because its management feels discouraged from applying for one.

3. Data and Methodology

3.1 Data

Our analysis relies primarily on data obtained from the SAFE survey conducted on behalf of the European Commission and the ECB, which is an ongoing survey gathering information about firms' access to finance within the European Union and has been conducted since 2009. We rely on the annual round of data collection (in the fall of each year) as this includes a sample of firms from the entire European Union. Firms in the sample

were randomly selected from the Dun & Bradstreet database. The sample is stratified by firm-size class, economic activity, and country. The sample size for each economic activity was chosen to guarantee satisfactory representation across the four largest industry sectors: manufacturing, construction, trade, and services. Agriculture, forestry, fishing, financial intermediation, public administration, activities of households, extra-territorial organizations, as well as non-profit and holding companies are excluded from the sample. In addition, the sample sizes were selected based on representation at the country level. The specific individual surveyed in each firm was a top-level executive and the questionnaire was administered in the main local language. Between 500 and 1,000 firms were interviewed in the annual round of data collection we rely upon. The original dataset contains 49,400 observations and that number reduced to 18,872 when we limited the dataset to entrepreneurial firms, defined as those firms that reported introducing new or improved products, or production processes, or organizational processes, or new ways of selling their products/services in the previous 12 months and/or rapidly grew during the previous period. We combine the SAFE dataset with information from Eurostat in order to have homogeneous data on GDP growth to control for macroeconomic conditions.

Data on the government initiatives comes from GEM that began to collect data in 1999 as a joint project between Babson College (USA) and London Business School (UK). The aim of the project is to collect data to explore why some countries have higher levels of entrepreneurship than others. The GEM survey data provides information about entrepreneurial intention, behavior, and the attitudes of individuals as well as on the entrepreneurial ecosystem. Our research relies on data on this last area.

3.2 Methodology

When analyzing survey data, it is often the case that one variable is observable only in a self-selected subsample of respondents. In the case of the borrower–lender relationship,

only individuals who borrow can default on loans and thus create the risk that banks must evaluate in their lending decisions. However, in order to obtain unbiased estimates of the probability of default and thus the probability of successfully obtaining a loan, it is also necessary to model the antecedent determinants of a successful loan application (Greene, 1998). Therefore, both aspects must be studied together, because the analysis of the probability of obtaining credit is made on a sample that is not randomly selected, as only individuals with certain characteristics have applied for loans. The same reasoning applies to the probability of being discouraged from applying for a loan, because it applies only to those firms that decided not to submit a loan application. In other words, the hypotheses under study must be tested using a subsample of firms that is not randomly selected.

Such problems can be studied within a bivariate probit with a sample selection setting (Greene, 2003, 710-714). In the most general terms, that entails two probit regressions with binary dependent variables:

$$y_1 = 1[x_1\beta + \epsilon_1 > 0] \quad (1)$$

$$y_2 = 1[x_2\delta + \epsilon_2 > 0] \; if \; y_1 = 1 \quad (2),$$

where x_1 and x_2 are explanatory variables and the error terms are bivariate normally distributed (ϵ_1, ϵ_2)~$BVN(0,1)$ with $Cov(\epsilon_1, \epsilon_2 \mid x_1, x_2) = \rho$. Here, y_1 denotes the selection variable. There are three types of observed outcomes in the sample whose unconditional probabilities are denoted as follows:

$$y_1 = 0 \; Prob(y_1 = 0 \mid x_1, x_2) = 1 - \Phi(x_1\beta) \quad (3)$$

$$y_1 = 1, y_2 = 0 \; Prob(y_1 = 1, y_2 = 0 \mid x_1, x_2) = \Phi_2(x_1\beta, -x_2\delta, -\rho) \quad (4)$$

$$y_1 = 1, y_2 = 1 \; Prob(y_1 = 1, y_2 = 1 \mid x_1, x_2) = \Phi_2(x_1\beta, x_2\delta, \rho), \quad (5)$$

with Φ and Φ_2 denoting the univariate and bivariate normal cumulative distribution functions respectively. The coefficients β, δ and ρ are jointly estimated by maximizing the following log-likelihood function:

$$\boldsymbol{L} = \sum_{y_1=1,y_2=0} \mathbf{ln}(\,\Phi_2(x_1\beta, -x_2\delta, -\rho) + \sum_{y_1=1,y_2=1} \mathbf{ln}(\,\Phi_2(x_1\beta, x_2\delta, \rho) + \sum_{y_1=0} \mathbf{ln}(\,\boldsymbol{\Phi}(x_1\beta) \quad (6)$$

Accordingly, the sample selection problem is solved by the specification of the likelihood function and will be different from the two-step Heckit procedure applied in the instance of a continuous dependent variable (Heckman, 1979). This implies that there is no need to calculate and include the inverse Mill's ratio in the equation of y_2 (Piga and Atzeni, 2007; Piga and Vivarelli, 2004).

In our setting, we apply this approach to study two pairs of dependent variables, the first of which is modeled as follows:

$$Submit_{ijt} = 1\left[\alpha + E_{jt}\beta + F_{it}\gamma + \epsilon_{1i} > 0\right] \quad (7)$$

$$Credit_{ijt}|_{Submit_{ijt}=1} = 1\left[\alpha + E_{jt}\beta + C_{it}\gamma + \epsilon_{2i} > 0\right]. \quad (8)$$

The selection variable, $Submit_{ijt}$, denotes whether firm *i* in country *j* has submitted a loan application in year *t*. The other dependent variable, $Credit_{ijt}$, identifies whether a firm has obtained credit when it has applied for a loan ($Submit_{ijt}$). Among the set of explanatory variables, a vector E_{jt} of government initiatives in country *j* at time *t* is derived from the GEM database. The separate vectors of firm's characteristics at time *t,* F_{it} originate from various waves of the SAFE dataset while the vector C_{it}contains macroeconomic data from Eurostat.

The second model under analysis is specified as:

$$Nosubmit = 1\left[\alpha + E_{jt}\beta + F_{it}\gamma + \nu_{1i} > 0\right] \quad (9)$$

$$Discouraged_{ijt}|_{No\_Submit_{ijt}=1} = 1\left[\alpha + E_{jt}\beta + C_{it}\gamma + \nu_{2i} > 0\right] \quad (10)$$

The selection variable, $Nosubmit_{ijt}$, denotes whether firm *i* in country *j* has chosen not to apply for a loan in year *t*. The other dependent variable, $Discouraged_{ijt}$, identifies those firms that reported being discouraged was the main reason for not applying for a loan. The explanatory variables in the second model are as described above.

We cannot rule out our regressions suffering from endogeneity. To address this issue, we estimate our models by instrumenting the independent variables for government initiatives with the debt to GDP ratio of a country and with the inflation rate. High/low values of debt to GDP ratio are likely to hinder/enhance a country's ability to engage in initiatives fostering entrepreneurship. The lower the debt/GDP ratio, the greater the opportunity for the country to expand public spending and, thus, to increase the support to entrepreneurial firms. The higher the debt to GDP ratio, the greater the constraints on public spending will be and thus the opportunity for the country to support entrepreneurial firms will reduce accordingly. This effect is even more important in Eurozone countries because member states are bound by common spending parameters that restrict governmental initiatives.

Inflation can be interpreted as a measure of whether the economy is growing as planned by governments and central banks. Accordingly, the government of a country sustaining an inflation rate at the upper end of the ECB recommended level will be concerned with overheating the economy and will be reluctant to provide a high level of support to entrepreneurial firms and may even opt to curtail initiatives previously implemented. Lower inflation will in turn tend to spur governments to stimulate the expansion of the economy, a

process likely to involve supporting entrepreneurship. The two variables above affect the variables of interest, but they are not supposed to affect a single firm's financial strategy. In other words, these two variables can perturbate our variable of interest, but they are not correlated with the error term of the regression that estimates the probability of obtaining credit. Because our econometric approach does not allow for the implementation of standard test procedures to assess the quality of the instruments, we use an alternative test procedure that is based on the work of Grilli and Murtinu (2018) as is discussed below.

The bivariate probit with sample selection and endogenous regressors is estimated using a command, *eprobit*, that is part of the suite of extended regression methods that was introduced in the Stata15 software package (Roodman, 2011).

The entrepreneurial ecosystem differs at the country level. This can generate clustering effects on the errors of the regressions. Accordingly, we estimate standard errors that are robust to the clustering of errors by considering different country clusters (applied to 28 countries). Because the dataset provides weights that restore the proportions of the economic weight (in terms of the number of employees) of each firm-size class, economic activity, and country, we estimate our regressions by including those weights. We estimate a set of different regressions, where we enter the E_{jt} independent variables one at a time. This approach avoids potential multicollinearity problems among the GEM variables.

We also implement some additional tests. First, given the significant differences in demand for credit among member countries of the European Union that have adopted the Euro currency (here, Eurozone countries) and those that have not (here non-Eurozone countries), we re-estimate our model separately for subsamples covering those two contexts in order to investigate whether the effect of government initiatives fostering entrepreneurship differs.

Furthermore, the marginal effect of government support and tax advantages on the probability of access to credit is calculated by breaking it down for different age and size classes and also by splitting our data into groups according to firm growth rate and the firms' innovation approach. We perform this analysis by exploring the effect in countries according to the quartile they belong to. Doing so allows us to explore whether a friendlier tax system/greater government support affects firms with different characteristics in different ways, and in that case, which groups benefit most. Government initiatives for entrepreneurship are expected to be of greater benefit to smaller, younger, faster-growing, and more innovative firms. In addition, by exploring the effect in different quartiles, we can examine the difference in terms of access to credit according to the intensity of the support the countries provide.

3.3 Dependent Variables

To explore the link between government initiatives and the demand for credit, we rely on the question in the SAFE dataset on whether a firm has applied for a loan in the last six months. We use the answer (the firm applied for a loan = 1; the firm did not apply for a loan = 0) as our first dependent variable (regression to estimate Equation 7). In order to examine the probability that firms obtain credit (regression to estimate Equation 8), we rely on the questions asked in SAFE to determine whether a firm obtained the credit it applied for in the previous six months. We use the answer to this question (the firm obtained credit = 1; the firm did not obtain credit = 0) as our second dependent variable. However, firms might not even have the opportunity to secure credit if they decided not to apply for fear of being rejected by the bank (discouraged borrowers): Such firms suffer from a lack of access to credit owing to self-selection. The SAFE dataset also collects information on this aspect when asking of a firm that did not apply for a loan if that was because the management was discouraged from doing so; that is, if management anticipated the bank would have rejected

the credit application. We use the reciprocal of the first dependent variable (firms that do not apply for a loan =1; firms that apply for a loan = 0) and the answer to the question that identifies discouraged borrowers (the firm is a discouraged borrower = 1; the firm is not a discouraged borrower = 0) as our third and fourth dependent variable in order to estimate Equations 9 and 10 respectively.

3.4 Independent Variables

We use two different independent variables to test our hypotheses. The first variable, *tax advantages*, is a score that measures fiscal measures introduced by government to support entrepreneurship. It is defined as "the extent to which public policies support entrepreneurship—taxes or regulations are either size-neutral or encourage new firms and SMEs." Our second variable, *government support*, is a GEM score that measures government support programs fostering entrepreneurship. It is defined as "The extent to which public policies support entrepreneurship." Given these two variables are correlated, we enter them individually to avoid collinearity issues.

3.5 Sample Split Variable

The probability of obtaining bank credit might depend on the setting entrepreneurial firms and banks are embedded in (Welter 2011; Moro et al. 2018). Bank lending in all member countries of the European Union (EU) is regulated by the Basel agreements, with Basel III (Bank for International Settlements, 2010) being the latest update on how banks must measure the risk they incur. Accordingly, the Basel agreements indirectly regulate the way in which banks assess their customers and the probability that they will lend to them.

However, public spending is regulated differently in EU countries depending whether they are members of the Eurozone. The countries in the Eurozone have ratified the Maastricht Treaty (based on the Treaty on the Functioning of the EU) that regulates public spending and thus restricts governments' options to expand it.

Consequently, we expect to find differences in the role that tax advantages and government support can play in helping entrepreneurial firms to access credit in Eurozone and non-Eurozone countries.

3.5 Control Variables

Previous research has identified aspects that impede firms' access to bank finance, including the characteristics of the firm (Gropp et al., 2012; Kysucky and Norden, 2014); the type and characteristics of the relationship between bank and firm (Angelini et al., 1998; Berger and Udell, 2006; Brown et al., 2013; Elsas and Krahnen, 1998; Harhoff and Körting, 1998; Moro and Fink, 2013); and the characteristics of the organization (Coal et al., 2015; Goldberg and White, 1998; Rauch and Hendrickson, 2002; Uchida et al., 2008). While traditionally these measures were researched in isolation, we follow the call by Lee et al. (2011) to offer a more holistic account of the entrepreneurial ecosystem, and accordingly include them as control variables.

Firms are clustered according to four age categories derived from SAFE. We use *firms up to 2 years old*; *firms between 2 and 5 years old*, and *firms between 5 and 9 years old* as dummy variables to identify the age group. Older firms are more likely to be successful when applying for a loan (Berger and Udell, 1995; Petersen and Rajan, 1994) since they have an established reputation that banks rely on when making lending decisions (Martinelli, 1997): For the same reason they are also less likely to be discouraged borrowers. We also control for a firm dimension in discriminating between *micro, small, medium-sized, and large firms*. Our expectation, in line with past research, is that younger firms should face greater difficulties in accessing credit (Petersen and Rajan, 1995, 1994). We control for the change in *labor costs* and in *turnover*. These are categorical variables that take the value -1, if the firm faces a reduction, 0 if there is no change, and +1 if there is an increase. Regarding the financial strategy implemented by firms, we include dummies that identify different sources

of finance used: *trade credit, leasing and factoring, retained earnings, additional equity, bank loans, and other loans*. We also include a set of a variables (*finance instruments*) that measure the financial sophistication of the firm by considering the number of alternative sources of finance it has used. Our argument is that firms that rely on a greater number of alternative sources of finance present a lower risk than those that rely on fewer: they have both a financial base that is diversified (reducing the risk that their financial resources will be exhausted) and their finances should be less opaque because they must produce information to satisfy the providers of funds. We also include a variable that measures the *challenges a firm faces* in different contexts; for example, finding customers, competition, access to finance, production costs, lack of skilled workers, regulation, and other issues. For each area the firms are asked to evaluate the challenges on a 10-point Likert-type scale. We generate the variable by adding together the scores that each firm allocated to each area. In addition, we include a variable that measures the economic risk perceived by firms (*firm outlook*). Finally, we consider the *creditworthiness* of the firm. Since our analysis focuses on firms that share one or more of the following characteristics of innovative firms, and we also include these indicators as control variables: 1) a variable that identifies *process innovativeness* and 2) a variable that identifies any *other type of innovativeness*. We also cluster the firms with a *high growth rate* and those that number business angels or venture capitalists among their shareholders. Finally, we identify the firms that already have a *bank loan*.[1]

Demand for credit can affect the probability of obtaining it: Firms operating in countries where there is a relatively low demand for credit might find it easier to access because there is less competition. In such countries, there should therefore be a higher probability that firms are granted credit and a lower probability that a firm will be a

[1] For a detailed description of the variables included in SAFE see European Central Bank, 2017, "European Commission and European Central Bank Survey on the Access to Finance of Enterprises" and on https://www.ecb.europa.eu/stats/ecb_statistics/html/index.en.html

discouraged borrower. We operationalize the *demand for credit* as the ratio between the number of firms that apply for a loan to the overall number of firms in each country in each year.

Moreover, we consider a set of country-specific and time-varying macroeconomic variables to capture the macroeconomic context in which the firms operate. We include the *change in the GDP* and, to account for the financial context, also an index measuring perceived economic outlook in general terms (*economic outlook*).

The dataset provides unmatched observations for five years (2013–2017) and therefore we also include four dummies that identify the *year* in which the data were collected.

As discussed in the methodology section, we simultaneously estimate the application for credit (Equation 7) and the probability of obtaining credit (Equation 8) as well as the probability of being a discouraged borrower (Equation 10) and the probability of not applying for a loan (Equation 9). While only firms in need of finance may decide to apply for a loan, at the same time, the probability of a firm obtaining credit is independent of the fact that it needs additional finance. Similarly, a firm that does not apply for a loan might have been influenced either by not requiring finance or because it is a discouraged borrower. Accordingly, our simultaneous regression model differentiates the regression that estimates the probability of applying for a loan/not applying for a loan by including two variables; namely, the fact that the firm states that it *needs additional long-term loans* and the fact that the firm states that it *needs additional short-term loans*.

Finally, as discussed in the methodology section, our model may suffer from endogeneity, and it therefore needs instruments that can perturbate our variables of interest but not affect our dependent variables. We identify two variables: the *debt to GDP ratio* and the *inflation rate*. As mentioned above, our argument is that countries with high debt to GDP

ratios will find it difficult to justify granting tax advantages and will have limited resources to support entrepreneurship financially (e.g., in the form of grants or discounted loans). We also include the inflation rate because inflation is typically a sign that an economy is overheating and when countries face higher inflation, they tend to cut stimuli to the economy (in the form of reductions to public spending) that can also mean reducing government initiatives for entrepreneurship (tax advantages and government support). Grilli and Murtinu (2018) explain that standard direct tests to assess the validity of instruments are not feasible when the dependent variables are binary, and we therefore followed their alternative approach and estimated Two-Stage Residual Inclusion (2SRI) regressions (Basu et al., 2017). The test consists of three steps. First, we ran a first-stage OLS model where the dependent variable was one of the two endogenous variables, either *debt to GDP ratio* or *inflation rate*. Second, we calculated the residuals of those regressions. Third, we estimate a probit model for equations (8) and (10), where we include, as additional regressors, the first-step residuals and each instrument separately. To account for selectivity, this second-stage probit is run only on the subsample of firms that applied for credit and the subsample of firms that did not. For the instruments to be considered valid exclusion restrictions, their coefficients should not be statistically significant in the second-step regression.

4. Descriptive statistics

The dataset used contains 18,872 observations from 28 EU countries for the period between 2013 and 2017. A summary of the descriptive statistics is reported in Table 1.

TABLE 1 HERE

The majority of the firms are SMEs (90%) and more than 80% are more than nine years

old. In terms of financing, firms use leasing, bank loans, and trade credit quite intensively, but do not seem to be greatly reliant on equity. More than two thirds of the firms are engaged in some form of innovation according to the criteria outlined in Section 3.5 above. Only 22% enjoy the support of a business angel or venture capitalist. Around 73.17% of the firms that apply for a loan obtained it, while 9.01% of those that did not apply are discouraged borrowers. The fact that the firms in the sample are largely well established, reflects the stratification of the original population. Cyprus has the largest proportion of old firms (91%) followed by Spain (83%) and Finland (81%). The Netherlands has the largest proportion of young firms (2.4%) followed by France (2.2%) and Spain (2.1%). The industry with the largest proportion of old firms is manufacturing (34%) followed by the service sector (31%). The largest number of young firms is found in the service sector (42%) and the next largest proportion is in manufacturing (26%).

As far as the variables of interest are concerned, the averages of the two GEM indexes used are quite similar (2.37 for government programs and 2.54 for tax advantage). At the same time there are variations around Europe. Figure 1A (tax advantage) and Figure 1B (government support) report the average GEM values for each country in our sample.

FIGURE 1A HERE

FIGURE 1B HERE

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5. Results

We simultaneously estimate the probability that a firm applies for a loan/does not

apply for a loan and the probability that a firm obtains a loan (test of H1a and H2a) or is a discouraged borrower (test of H1b and H2b). In addition, we estimate our model while monitoring for any potential endogeneity of our variables of interest. Accordingly, we present two pairs of models: the first pair focuses on the probability of obtaining credit (H1a and H2a): Model 1 addresses tax advantages, whereas Model 2 addresses government support. Each model includes two simultaneously estimated regressions: the probability of applying for a loan and the probability of obtaining a loan conditional on having applied for a loan. Then, we re-estimate the same models but focus on the probability of being a discouraged borrower conditional on not having applied for a loan (H1b and H2b): Model 3 explores the role of tax advantages and Model 4 the role of government support.

5.1 Government Initiatives and Obtain Credit

The results regarding the impact of government initiatives on the probability that entrepreneurial firms obtain credit are reported in Table 2.

TABLE 2 HERE

In Model 1, regression 1 reports the results of the probability of obtaining credit and explores the effect of tax advantages fostering entrepreneurship. An examination of the covariates establishes that the firm dimension has the expected results (smaller firms are less likely to apply for a loan), while age has no effect. Among the sources of finance, relying on profit or on past loans is significant and increases the probability of applying for a loan, while the use of leasing/factoring reduces it. At the same time, the fact that the firm is backed by business angels (BA) or venture capital (VC) or by one or more banks reduces the probability of it applying for a loan. It is possible that such firms can already count on access to funds, thus reducing their need for further finance. Labor cost, turnover, creditworthiness, level of

financial sophistication, and the intensity of the challenges facing the firm do not affect the probability of that firm applying for a loan. A firm's perceived economic outlook and a greater demand for credit is positively and significantly related to the probability of it applying for a loan. The level of process innovativeness has a marginal positive effect on the probability of applying for a loan. As far as the variable of interest is concerned, a more favorable taxation regime does not affect the probability of applying for a loan.

We test Hypothesis 1a in regression 2 that explores the impact of tax advantages on the probability of entrepreneurial firms obtaining a loan. Tax advantages exert a positive and significant effect on the probability of entrepreneurial firms obtaining a bank loan. This finding supports H1a. As far as the covariates are concerned, this specification supports the point that smaller firms are less likely to obtain credit. In this case too, retained profit and previous bank loans are significant and increase the probability of obtaining credit, while the use of trade credit reduces the probability of obtaining a loan. A positive general economic outlook and a firm's creditworthiness increase the probability of it obtaining a loan, while the innovativeness of the firm in terms of product/business organization has a negative impact on its obtaining credit. The financial sophistication of the firm reduces the probability of it obtaining credit. A greater demand for credit reduces the probability of obtaining a loan because, as discussed in the data section, such demand increases the competition among firms seeking a loan.

Model 2 analyzes the effects of government programs fostering entrepreneurship on the probability that an entrepreneurial firm applies for a loan (regression 3) and the probability of obtaining the loan (regression 4). The results of regression 3 are similar to those of regression 1 exploring the probability of applying for credit in the case of tax advantages except for the covariate that captures the role of the economic growth in a country, which in this case proves to be marginally negative and significant. As far as the

variable of interest is concerned, government programs fostering entrepreneurship do not affect the probability of entrepreneurial firms applying for a bank loan.

We tested Hypothesis 2a in regression 4 that assesses the impact of government programs fostering entrepreneurship on the probability of an entrepreneurial firm obtaining a loan (conditional on the firm having applied for a loan). We find government programs fostering entrepreneurship exert a positive and significant effect on the probability of obtaining a bank loan. Accordingly, H2a is supported. As far as the covariates are concerned, this specification presents results that are in line with those obtained in regression 2.

We report the results of the test of the validity of instruments in Table A1 in the Appendix. This table reports the coefficients of the two 2SRI regressions: tax advantages and government programs fostering entrepreneurship. Our instruments are not statistically significant in either of the regressions, thus providing reassurance that they constitute valid exclusion restrictions that have no explanatory power over the main dependent variable.

5.2 Government Initiatives and Discouraged Borrowers

The findings regarding the impact of government initiatives fostering entrepreneurship on the probability that firms are discouraged from applying for bank credit are reported in Table 3.

TABLE 3 HERE

Model 3, regression 5 explores the probability of a firm not applying for a loan. In this regression, firm size shows the expected effect, with smaller-sized firms being more likely to be discouraged from applying for a loan, while firm age does not have an effect. Retaining earnings, a positive economic outlook, access to bank loans, firm creditworthiness and the support provided by the bank system reduce the probability that a firm will not apply

for a loan. Similarly, firms that pursue a more innovative agenda in terms of process developments are less likely to avoid applying for a loan. At the same time, a greater use of leasing and factoring increases the probability that a firm will not apply for a loan because those are alternative sources of finance to loans. In addition, a greater demand for credit reduces the probability that a firm will not apply for a loan. Finally, additional firm requirements in terms of both short- and long-term finance, reduce the probability that a firm will not apply for a loan. As far as the variable of interest is concerned, tax advantages do not affect the probability that an entrepreneurial firm will not apply for a bank loan.

We tested Hypothesis 1b in regression 6 exploring the impact of tax advantages on the probability that a firm will not become a discouraged borrower given that it does not apply for a loan. We find that tax advantages do not affect the probability of an entrepreneurial firm becoming a discouraged borrower. Accordingly, H1b is not supported. As far as the covariates are concerned, there are some changes with respect to regression 5: age proves to have a very marginal effect (the class of 2–5 year-old firms is marginally significant and positively related to being a discouraged borrower); leasing/factoring proves not to be significant while the access to other loans and the cost of labor prove significant; they decrease the probability that a firm will become a discouraged borrower; general economic outlook and a firm's creditworthiness reduce the probability of a firm becoming a discouraged borrower; a firm's process innovativeness proves not to be significant; while the intensity of the operational challenges faced by firms increases the probability that they will become discouraged borrowers.

Model 4, regression 7 explores the effect of government programs fostering entrepreneurship on the probability of an entrepreneurial firm not applying for a bank loan. This regression is qualitatively identical to the corresponding regression 5 in Model 3. Government programs fostering entrepreneurship do not affect the probability that an

entrepreneurial firm will not apply for a loan.

We test Hypothesis 2b in regression 8, which explores the impact of government programs fostering entrepreneurship on the probability that a firm not applying for a loan is driven by the firm being a discouraged borrower. We find that government programs fostering entrepreneurship do not reduce the probability of an entrepreneurial firm becoming a discouraged borrower. Accordingly, H2b is not supported.

An inspection of Table A1 confirms that the choice of instruments appears to be valid for both the regressions addressing tax advantages and that addressing government programs fostering entrepreneurship. Moreover, even in the analysis of discouraged borrowers, where, our measures of government intervention do not seem to play a strong role, the evidence offers reassurance that the instruments have no explanatory power over the main dependent variable.

5.3 Eurozone and non-Eurozone Area

As discussed above Eurozone and non-Eurozone countries face different budget constraints that can affect their governments capability to foster entrepreneurship, with the constraints for Eurozone countries potentially more restrictive. In addition, while the level of government initiatives for entrepreneurship (tax advantage 2.37 in the Eurozone versus 2.26 in non-Eurozone territories; and government support programs 2.86 in the Eurozone versus 2.51 in non-Eurozone territories) does not differ significantly between Eurozone and non-Eurozone member countries, the level of demand for credit (0.38 in the Eurozone versus 0.28 in the non-Eurozone territories) is significantly higher (i.e., by.05%) in the Eurozone than in the non-Eurozone territory. The stronger demand for credit suggests that banks apply greater scrutiny when selecting among loan applicants, so that the access to tax advantages and government support can play an important role. This suggests that firms in Eurozone might derive so little support from their governments that it may not be relevant to them in terms of

advancing the business; however, the greater scrutiny that firms face in Eurozone countries (because of the greater demand for credit) may enhance the impact of any government initiatives fostering entrepreneurship (tax advantages and government support programs) compared to those in non-Eurozone countries, with the result that those initiatives play an important role in accessing credit. In order to explore these two forces, we re-estimate our models on split samples (Eurozone and non-Eurozone countries). The respective regressions are not reported for reasons of space but are available on request.

The regressions on the subsample of firms operating in Eurozone countries show no major changes with respect to the control variables and both variables of interest (tax advantages and government support) are significant and, moreover, positively affect the probability of entrepreneurial firms obtaining a loan. In the subsample including firms operating in non-Eurozone countries, only the variable *tax advantage* proves to be significant—and then only very marginally—but it is negatively related to the probability of obtaining credit. The results suggest a major impact of demand for credit: greater demand implies that banks scrutinize the risk incurred more rigorously when making the decision on whether to lend. In such a context, any information that reduces the risk is factored. Tax advantage and government support, as risk reducing factors, are therefore exploited by banks and consequently contribute to increasing the probability that firms will have access to credit.

We replicate the same analysis in the case of discouraged borrowers because we cannot rule out that those variables that are insignificant when estimated on the overall sample, become significant when we look at the subsamples. We find that in neither the subsample comprising Eurozone countries, nor in that covering non-Eurozone countries do government initiatives exert any effect on the probability of becoming a discouraged borrower conditional on the fact that the firm does not apply for a loan.

5.4 Marginal Effects Analysis

Kennedy (2002) warns that it is important not to confuse significance with substance and therefore it is essential to explore the economic impact of governmental initiatives fostering entrepreneurship. Accordingly, we explore the marginal effects of a change in our measures tax advantages / government support programs on the probability of entrepreneurial firms obtaining credit. We focus our analysis on obtaining credit because it is the only dependent variable where we found government initiatives fostering entrepreneurship had a significant impact. To obtain a nuanced picture, we explore the impact of such a change by differentiating countries according to the quartile they belong to. Owing to examining the situation for entrepreneurial firms, we explore the impact for 1) different firm size, 2) firm age, 3) growth rate, and 4) innovativeness. With entrepreneurial firms being defined as young, small, innovative, and fast-growing, these firms are the target group for governmental initiatives fostering entrepreneurship and, accordingly, should benefit most from tax advantages and government support.

The impact of a change in the tax advantage policy on the firm's probability of obtaining credit according to its dimension is reported in Figure 1A.

FIGURES 1A AND 1B HERE

Figure 1 shows that the impact of tax advantages on smaller firms is larger than it is on bigger firms: for micro firms, a change in the tax advantage generates an increase of 10.4% in the probability of obtaining credit in countries in the bottom quartile while the corresponding increase in the case of firms operating in countries in the top quartile is 15.1%. The results on changes in government support programs on the probability of obtaining credit are shown in Figure 1B. Again, smaller firms benefit more than larger ones from government support policies. Specifically, for micro firms the increase in the probability of obtaining

credit is between 12.6% and 18.5%. However, large firms can also benefit from government support because in their case, the increase in the probability of obtaining credit is between 11.4% and 13.4%.

The examination of the impact of changes in tax advantages and government support for firms according to their age class is reported in Figures 2A and 2B.

FIGURES 2A AND 2B HERE

Figure 2A shows the impact of a change in tax advantage on the probability of obtaining credit. The trends clearly show a flat curve for all the firms that are younger than 10 years old, and those same firms also benefit most from a more favorable taxation system: A positive change in the tax advantage increases the probability of obtaining credit among younger firms by between 15.5% (firms of between two and five years old in top quartile countries) and 11.6% (firms of between five and 10 years old in bottom quartile countries). In the case of established firms (those more than 10 years old) this probability increases by between 9.6% and 12.6%. Figure 2B reports the corresponding marginal effect analysis in terms of government support programs. In this case the firms that benefit most from a change in government support programs are those that belong to the mid-aged class of firms between two and 10 years of age that show an increase in the probability of obtaining credit of between 18.0% and 13.8%. Older firms enjoy an increase in the probability of obtaining credit of between 12.2% and 14.9% while the corresponding results for the very young firms are between 14.3% and 16.5%.

Figures 3A and 3B report the marginal effects analysis for the fast-growing versus slow-growing firms.

FIGURE 3A AND 3B HERE

The trends suggest that the firms that benefit most from a more favorable taxation system are those that grow at a faster rate: a change in the tax advantage increases the probability of obtaining credit for faster-growing firms from between 11.6% and 13.5%. Figure 3B reports the corresponding marginal effect analysis in terms of government support programs. Furthermore, in this case, the firms that benefit most from an increase in the government support programs are those that grow faster (increase between 8.9% and 11.6%).

Finally, we present the results with a focus on more innovative versus less innovative firms (Figures 4A and 4B).

FIGURES 4A AND 4B HERE

Firms that innovate more benefit most from government initiatives fostering entrepreneurship. In the case of changes to the tax advantage bestowed, the probability of innovative firms obtaining credit rises by between 9.8% and 12.2%, while firms that do not innovate extract an increase of only between 7.6% and 8.4%. Figure 4B explores the effect of change in the level of government support. In this case the impact is even greater: Firms that pursue both product and process innovation enjoy an increase in the probability of accessing credit of between 13.4% and 14.1%, compared to between 9.6% and 10.6% for firms that do not innovate.

A common pattern in the results presented above is that changes in government support affect the probability of obtaining credit in both more supportive and less supportive countries and for any type of firm, while the more entrepreneurial ones benefit most. In addition, a pattern emerges from the comparison between the two types of government

initiatives: Government support programs have a greater impact than tax advantages.

6. Discussion

Our results suggest that government initiatives in terms of tax advantages and government support programs have a positive spillover effect on the probability that a firm obtains credit from a bank; while there is no spillover effect on the probability either of a firm applying for a loan or becoming a discouraged borrower. We also find evidence that government initiatives play a more important role in countries where the demand for credit is greater (in the Eurozone) than in countries where there is less demand for credit (the non-Eurozone territories). These results provide important insights.

In their attempts to promote entrepreneurship, the major challenge for governments is to provide the proper type and scale of support for entrepreneurial firms in order to effectively address market failure (Rotger et al., 2012). If governments provide too little support, they will not be able to stimulate entrepreneurship sufficiently to reach a socially optimal level, which might weaken the economy as a whole. However, if governments provide too much support, they risk encouraging low-quality firms (e.g., those with weak business models or weak venture teams), and such firms tend to fail not long after they have received support. Resources invested in such unsustainable ventures are misallocated and wealth is destroyed. On an aggregate level, government initiatives fostering entrepreneurship applied on too large a scale can contribute to a temporary overheating of the economy. Finally, badly designed government intervention can crowd out finance from banks and private investors such as BA and venture capitalists compromising the efficiency of the financial market (Cumming et al., 2018). In addition, when accounting for the particularities of context in this study, it becomes obvious that the free circulation of capital, labor, and goods within the European Common Market poses an additional challenge to policy makers.

Excess support for entrepreneurship in one EU member state can prompt firms to relocate their operations to that supportive EU member state, which might trigger a spiral of competition among EU member countries that pushes the scale of government initiatives fostering entrepreneurship over the optimal level. However, to ensure optimal allocation of resources, it is essential that governments find the right balance in their initiatives fostering entrepreneurship (Acs et al., 2018; Acs and Szerb, 2007).

To this end, our results are quite reassuring. The evidence we elicit suggests that governments within the EU seem to implement initiatives fostering entrepreneurship on the right scale to generate positive spillover effects. The fact that government initiatives fostering entrepreneurship boost the probability of entrepreneurial firms obtaining a positive lending decision from banks signals that such initiatives are effectively addressing the market failure economies face regarding entrepreneurial activity (Bertoni et al., 2019; Cumming et al., 2018). Our findings also show that government initiatives do not affect the probability of entrepreneurial firms applying for loans, or that of firms becoming discouraged borrowers. While at first sight this finding might seem to question the effectiveness of government initiatives fostering entrepreneurship, in fact it highlights that these initiatives are provided on an appropriate scale. This is because overly supportive government initiatives would encourage low-quality firms to apply for a loan and if they did so, the probability that they would become discouraged borrowers would reduce, which would expose lenders to potentially damaging risk. At the same time, excessive governmental support would lead to the state taking on too much risk related to unsustainable ventures, making it attractive for entrepreneurs to pursue even low-quality venture projects. In other words, when governments support access to too much credit, they can instill the idea that credit is easier to access thus encouraging weak firms to apply for a loan confident they will succeed in obtaining it. In our results, we do not see evidence pointing in the direction of an oversupply of government

initiatives fostering entrepreneurship; government initiatives instead seem to have a positive spillover effect (Cumming et al., 2018).

In the previous section we conclude that both tax advantages and government support have an impact on banks' lending behavior but they do not affect entrepreneurs' borrowing behavior. Accordingly, government initiatives in the EU member states seem to effectively facilitate access to credit for entrepreneurial firms without warping management borrowing decisions. However, alongside monitoring the scale of its initiatives fostering entrepreneurship, government must choose the right type of measures. This aspect can be addressed by examining the economic impact of the different types of government initiatives fostering entrepreneurship illustrated in this study. Our evidence suggests government support programs have a greater impact than tax advantages. There are several possible reasons for that finding: First, the measures labeled government support programs (e.g., grants, guarantees, and funds) tend to be more selectively granted to entrepreneurial firms than tax advantages; whereas tax advantages are typically offered to all entrepreneurial firms, government support programs target firms with specific characteristics in terms of factors such as industry, firm size, location, and market served (Cumming and Li, 2013; Cumming et al., 2018). Second, often access to government support programs is subject to the evaluation of a project plan detailing the anticipated effects of the support measure on policy goals such as job creation, growth, and innovation. The competitive approach used to allocate government support implies that only those firms that are pursuing convincing strategies in line with the government's policy goals tend to be successful in the application process. Accordingly, being able to access government support programs signals to the bank that the entrepreneurial venture (e.g., business model and venture team) has merit (Bertoni et al., 2019; Guerini and Quas, 2016) and the consequent spillover effect is that such information helps the bank to take an informed lending decision. Tax advantages are open to all

entrepreneurial firms and just inject extra cash into firms' bank accounts while providing no such information on the merit of the entrepreneurial venture. Third, the specificity of the government support programs implies that they are designed to address particular weaknesses of entrepreneurial firms and the associated risks. For instance, a firm that lacks assets to obtain a collateralized loan may benefit from government guarantees. Such government support programs not only provide support to firms, but at the same time have positive spillover effects on banks' lending decisions because they allow banks to hedge and reduce the specific risk incurred by a lender to an entrepreneurial firm. A very general initiative such as a tax advantage is not able to address such very specific risks incurred by banks when lending to entrepreneurial firms. In general, government support programs seem to be more effective in fostering entrepreneurial firms' access to bank finance, because that type of initiative is more selective and better targeted (Bertoni et al., 2019; Cumming et al., 2018).

The last aspect we must explore is whether government initiatives to foster entrepreneurship target the right firms, that is, those that are entrepreneurial (i.e., young, small, innovative, and high-growth) and, hence, address the systematic disadvantages caused by market failure. Our results show that any change in either tax advantages or government support programs play a greater role for younger than for older firms and for those that are smaller rather than larger. In addition, we find that those firms with higher growth rates and those pursuing innovation the most intensively enjoy the greatest boost to their efforts to obtain credit induced by government initiatives fostering entrepreneurship. This finding adds support to the assertion that in the EU, government initiatives fostering support for entrepreneurship are appropriately designed to have a positive spillover effect on the lending decisions of banks and of firm's management (Cumming et al., 2018).

7. Conclusion

The current research analyzes the impact of government initiatives fostering entrepreneurship on firms' access to bank credit across the member countries of the EU. We found that government initiatives do not affect the demand for credit but do positively affect firms' ability to obtain credit. The evidence also suggests that government initiatives do not influence a firm's decision to apply for a loan and pursue projects. Hence, such initiatives do not modify the demand for credit by affecting the expected performance of the projects in question. However, they influence the banks' perception of the risk incurred when lending to firms; hence, banks are more likely to lend to entrepreneurial firms because they perceive that doing so entails less risk. We also discovered differences between countries where there is a high demand for credit (those in the Eurozone) and those where the demand for credit is low (non-Eurozone countries). In the former context, bank processes for selecting borrowers are more prudent: Any additional factor that signals the strength of the applicant and thus reduces the risk the bank incurs is taken into consideration and positively affects the probability of obtaining credit.

Our results are very intriguing in that they stress the importance of policies that have positive spillover effects in that they reduce the risk lenders incur when lending to entrepreneurial firms. More importantly, our evidence suggests that government initiatives fostering entrepreneurship do not affect the decision of entrepreneurs on whether to borrow. If anything, they tend to affect the probability of obtaining credit among the more entrepreneurial firms. Overall, our evidence suggests that the European governments as a group implement effective policies to support entrepreneurship. Avoiding negative spillover effects and distortion is very important, because in a functioning economy the decision whether to pursue an entrepreneurial venture has to be taken based on the intrinsic capability of the project to generate benefits for the investors rather than being motivated by governmental initiatives.

However, our results cannot easily be generalized and should be interpreted with the limitations of this study in mind. First, because the available data report whether the applicants have previously been denied finance from alternative sources, we cannot account for possible inferences of such rejections on the relationships studied in this research. Previous research indicates that bank finance is not necessarily the first choice for firms (Cosh et al., 2009). The aforementioned limitation offers an attractive opportunity for future research. In addition, readers should bear in mind that we explore a specific context, the EU. However, our results are interesting and relevant for all countries that want to implement government support programs fostering entrepreneurship because they offer guidance on which aspects must be accounted for when such initiatives are chosen, and their scale is decided upon. In addition, we focus on two types of governmental initiatives (tax advantages and governmental support programs). Accordingly, we cannot rule out that different results would be obtained if other types of government initiatives fostering entrepreneurship were considered.

The limitations of our work suggest further areas of investigation. First, it would be interesting to expand the analysis to other countries. Two particular streams of research seem particularly attractive. The analysis could be replicated in other developed countries, particularly if they have a different tradition in terms of entrepreneurial development, government initiatives, and bank lending techniques; an example might be the USA. The analysis could also focus on developing countries, particularly fast-growing ones with a focus on entrepreneurship. Second, it would be interesting to conduct a fine-grained analysis of government initiatives. As discussed, we use rather general metrics developed by GEM that sum up various specific measures in an index. Governments can, however, adopt many different measures under each type of initiative, some of which might be more effective than others because different measures leverage different aspects of entrepreneurial firms and the

ways they access bank finance. Accordingly, a more detailed analysis might provide a deeper insight into government initiatives and their impact on firms' bank lending. Such an analysis would have to be based on either collecting detailed data in a comprehensive sample of countries or sorting out the biases in the data governments provide on the scale and type of their initiatives fostering entrepreneurship as called for in the pioneering study of Lundström et al. (2014).

Notwithstanding the above limitations, our study indicates that government initiatives play a more successful role in fostering entrepreneurial firms' access to bank finance without causing market distortions than has been acknowledged to date.

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Table 1: Descriptive Statistics

Variable	Mean	Std. Dev	Min	Max
Loan application	.2293	.4204	0	1
Loan obtained (subject to application)	.7317	.4639	0	1
Discouraged borrower (subject not applying)	.0901	.4544	0	1
GEM - Tax advantage	2.3404	.5584	1.3500	3.7700
GEM - Government support	2.5789	.4751	1.6600	3.9600
Micro firm	.2938	.4555	0	1
Small firm	.2993	.4579	0	1
Medium firm	.2952	.4561	0	1
Age up to 2 yrs.	.0141	.1178	0	1
Age 2 to 5 yrs.	.0548	.2276	0	1
Age 5 to 10 yrs.	.1338	.3404	0	1
Equity	.0428	.2024	0	1
Retained profits	.2346	.4237	0	1
Trade credit	.2817	.4498	0	1
Leasing and factoring	.3905	.4878	0	1
Bank loans	.3588	.4796	0	1
Other loans	.1319	.3384	0	1
Labor cost change	.4957	.6232	-1	1
Turnover change	.2864	.7945	-1	1
Firms involved in new process development	.4233	.4940	0	1
Firms involved in other innovation	.6524	.4761	0	1
Firms with high growth rate	.2272	.4190	0	1
Firms with BA_VC investors	.2460	.4307	0	1
Firms with bank support	.1504	.6951	-1	1
Pressing problems	31.3072	8.5126	0	50
Financial sophistication	4.2849	2.5052	1	20
Firm perception of economic outlook	.2224	.7367	-1	1
Firm creditworthiness	.2370	.6094	-1	1
General economic outlook	-.0169	.7326	-1	1
Change in GDP	.02067	.0259	-.0596	.2557
Demand of credit	.3535	.0830	.1517	.6083
The firm needs additional short-term finance	.2108	.6198	-1	1
The firm needs additional long-term finance	.2389	.6372	-1	1
Debt: GDP	83.5787	35.3225	.0900	1.8080
Inflation rate (year)	.6326	.9334	-0.0160	.0037

Figure 1A: Average values of the GEM score for Tax Advantage

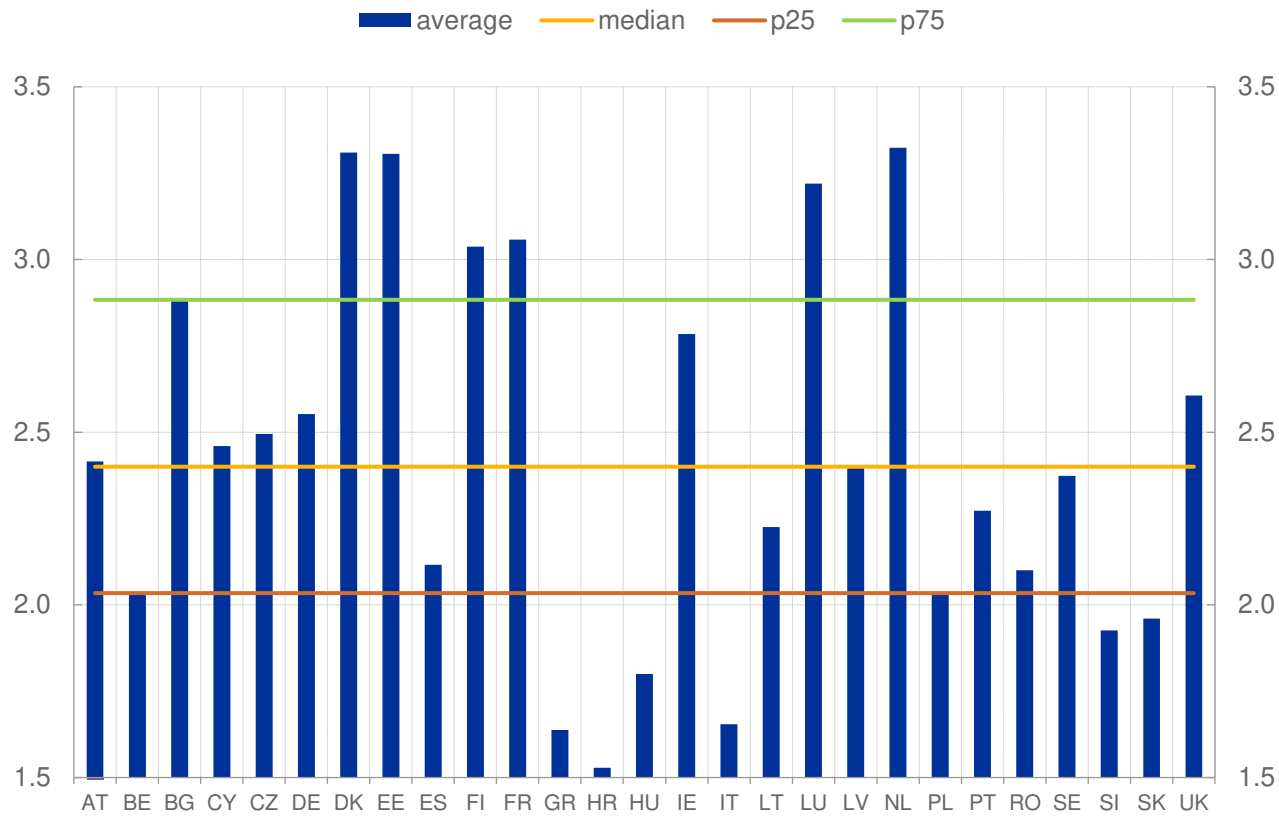


Figure 1B: Average values of the GEM score for Government Support

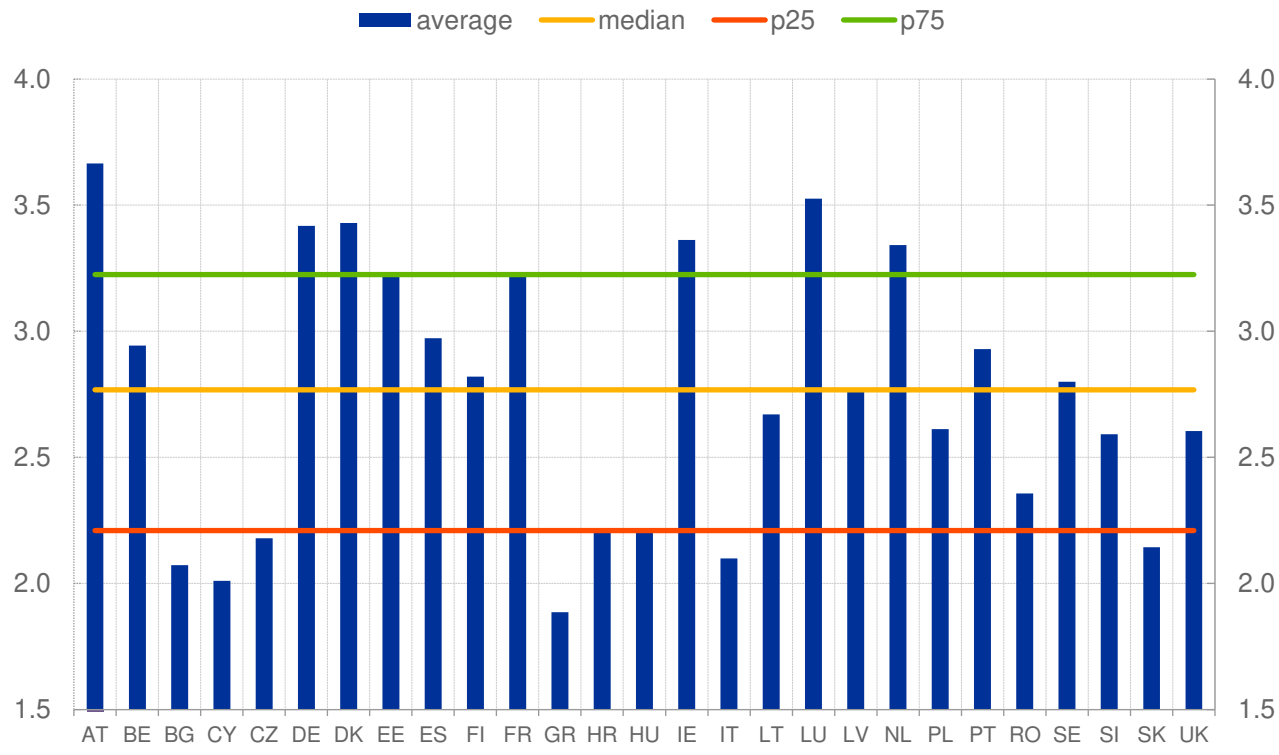


Table 2: Obtain Credit

Dependent Variables: *Apply for Credit and Obtain Credit;* Variables of interest: *Index for tax support to entrepreneurial firms; Index for the government support policies;*

Control Variables: *firm dimension (dummies for micro, small and medium firms); age of the firm (dummy for younger than 2 years, 2–5 years, 5–9 years); Source of funding used (dummy for use of equity, retained earnings, trade credit, leasing/factoring, bank, other); change in labor costs (increase, stable, decrease); change in turnover (increase, stable, decrease); firm innovativeness in process; firm other innovativeness (use any type of innovation); firm's growth rate (dummy for high growth rate firms); Business Angels or Venture Capital involvement (dummy if BA or VC are shareholders of the firm); bank support (dummy about whether the bank is supportive); Firm sophistication (number of alternative sources of finance used), pressing problems (amount of general challenges that the firm is facing); Firm's perceived economic outlook; Firm creditworthiness; Bank perceived economic outlook; Economic outlook (change in the GDP); Demand for credit (as a ratio of the firms demanding credit among all firms); Firm's short-term credit needs; firm's long-term credit needs.*

	(1) Model 1 Obtain Credit Innovative	(2) Model 1 Obtain Credit Innovative	(3) Model 2 Obtain Credit Innovative	(4) Model 2 Obtain Credit Innovative
VARIABLES	APPLIED	OBTAINED	APPLIED	OBTAINED
GEM - Tax advantages for entrepreneurship	***0.118***	***0.611****		
	(0.166)	***(0.250)***		
GEM - Government support for entrepreneurship			***0.111***	***0.622****
			(0.150)	***(0.266)***
Dummy micro firm	-0.254***	-0.318***	-0.252***	-0.322***
	(0.0655)	(0.120)	(0.0647)	(0.121)
Dummy small firm	-0.135***	-0.216*	-0.136***	-0.221*
	(0.0432)	(0.122)	(0.0428)	(0.124)
Dummy medium firm	-0.0263	-0.0709	-0.0268	-0.0716
	(0.0520)	(0.0746)	(0.0520)	(0.0744)
Dummy age up to 2 yrs.	-0.0821	0.0705	-0.0823	0.123
	(0.155)	(0.199)	(0.155)	(0.208)
Dummy age 2 to 5 yrs.	0.0381	-0.254**	0.0390	-0.256**
	(0.0343)	(0.113)	(0.0347)	(0.115)
Dummy age 5 to 10 yrs.	-0.0187	-0.172*	-0.0144	-0.170
	(0.0353)	(0.103)	(0.0353)	(0.103)
Equity	-0.0374	0.0792	-0.0351	0.0972
	(0.0871)	(0.117)	(0.0862)	(0.123)
Retained profits	0.111***	0.165**	0.111***	0.169**
	(0.0292)	(0.0805)	(0.0293)	(0.0785)
Trade credit	0.0363	-0.107**	0.0492	-0.0999**
	(0.0524)	(0.0487)	(0.0469)	(0.0428)
Leasing and factoring	-0.152***	-0.0578	-0.157***	-0.0555
	(0.0585)	(0.0657)	(0.0605)	(0.0629)
Bank loans	1.603***	1.463***	1.605***	1.454***
	(0.0500)	(0.114)	(0.0501)	(0.111)
Other loans	0.0896	-0.102*	0.0835	-0.109**
	(0.0644)	(0.0563)	(0.0667)	(0.0520)
Labor cost change	0.00344	0.108***	0.00299	0.111***
	(0.0199)	(0.0380)	(0.0189)	(0.0396)
Turnover change	-0.00166	0.0407	-0.00343	0.0443
	(0.0241)	(0.0557)	(0.0240)	(0.0565)
Firms involved in new process development	0.0452**	-0.0469	0.0479**	-0.0487
	(0.0209)	(0.0554)	(0.0218)	(0.0542)
Firms involved in other innovation	0.0833	-0.171***	0.0795	-0.175***
	(0.0562)	(0.0561)	(0.0573)	(0.0565)
Firms with high growth rate	0.0899***	-0.250**	0.0968***	-0.247**
	(0.0254)	(0.122)	(0.0258)	(0.120)
Firms with BA_VC investors	-0.104***	-0.0461	-0.104***	-0.0351
	(0.0301)	(0.0974)	(0.0297)	(0.0963)
Firms with Bank support	-0.0715***	0.573***	-0.0717***	0.567***
	(0.0257)	(0.0412)	(0.0246)	(0.0426)
Financial Sophistication	0.000127	-0.0688***	-0.000731	-0.0689***
	(0.00762)	(0.0229)	(0.00753)	(0.0256)
Pressing problems	-0.00284	0.0109***	-0.00326	0.00980***
	(0.00236)	(0.00358)	(0.00206)	(0.00349)
Firm perception of economic outlook	0.0623**	-0.111**	0.0639**	-0.115**
	(0.0309)	(0.0513)	(0.0314)	(0.0512)
Firm creditworthiness	0.0277	0.0828***	0.0241	0.0787***
	(0.0438)	(0.0251)	(0.0444)	(0.0253)
General economic outlook	0.0163	0.0871***	0.0144	0.0848***
	(0.0183)	(0.0211)	(0.0184)	(0.0217)
Change in GDP	-0.0164	-0.0411***	-0.0164*	-0.0414***
	(0.0107)	(0.0157)	(0.00884)	(0.0124)
Demand for credit	3.339***	-0.750*	3.273***	-0.789*
	(0.370)	(0.428)	(0.309)	(0.473)
The firm needs additional short-term finance	0.121***		0.123***	
	(0.0418)		(0.0432)	
The firm needs additional long-term finance	0.530***		0.531***	
	(0.0298)		(0.0298)	
Constant	-2.599***	-0.696	-2.595***	-0.958
	(0.496)	(0.967)	(0.497)	(1.111)
Wave	yes	yes	yes	yes
Observations	18,782	18,782	18,782	18,782
N_clust	27	27	27	27

Sig: *<.10; **<.05 ***<.01; Robust standard errors

Table 3: Discouraged Borrowers - 28 EU Countries

Dependent Variables: *Do not apply for credit and Discouraged Borrowers;* Variables of interest: *Index for tax support to entrepreneurial firms; Index for the government support policies;*

Control Variables: *firm dimension (dummies for micro, small and medium firms); age of the firm (dummy for younger than 2 years, 2–5 years, 5–9 years); Source of funding used (dummy for use of equity, retained earnings, trade credit, leasing/factoring, bank, other); change in the labor costs (increase, stable, decrease); change in turnover (increase, stable, decrease); firm innovativeness in process; firm other innovativeness (use any type of innovation); firm's growth rate (dummy for high-growth-rate firms); Business Angels or Venture Capital involvement (dummy if BA or VC are shareholders of the firm); bank support (dummy about whether the bank is supportive); Firm sophistication (number of alternative sources of finance used), pressing problems (amount of general challenges that the firm is facing); Firm's perceived economic outlook; Firm creditworthiness; Bank perceived economic outlook; Economic outlook (change in the GDP); Demand for credit (as a ratio of the firms demanding credit among all firms); Firm's short-term credit needs; firm's long-term credit needs.*

VARIABLES	(5) Model 3 Discouraged Innovative (APPLIED)	(6) Model 3 Discouraged Innovative (OBTAINED)	(7) Model 4 Discouraged Innovative (APPLIED)	(8) Model 4 Discouraged Innovative (OBTAINED)
GEM - Tax advantages for entrepreneurship	***-0.112***	***-0.340***		
	(0.165)	***(0.330)***		
GEM - Government support for entrepreneurship			***-0.106***	***-0.359***
			(0.150)	***(0.338)***
Dummy micro firm	0.255***	0.314***	0.254***	0.313***
	(0.0666)	(0.0489)	(0.0657)	(0.0476)
Dummy small firm	0.135***	0.133***	0.137***	0.133***
	(0.0448)	(0.0505)	(0.0444)	(0.0507)
Dummy medium firm	0.0291	0.00903	0.0294	0.00791
	(0.0514)	(0.0517)	(0.0514)	(0.0524)
Dummy age up to 2 yrs.	0.0935	-0.0624	0.0941	-0.0577
	(0.155)	(0.147)	(0.155)	(0.149)
Dummy age 2 to 5 yrs.	-0.0277	0.141*	-0.0287	0.144*
	(0.0342)	(0.0734)	(0.0347)	(0.0746)
Dummy age 5 to 10 yrs.	0.0206	0.103	0.0162	0.104
	(0.0366)	(0.0660)	(0.0368)	(0.0669)
Equity	0.0341	0.175	0.0313	0.178
	(0.0803)	(0.160)	(0.0797)	(0.160)
Retained profits	-0.112***	-0.116**	-0.112***	-0.119**
	(0.0291)	(0.0577)	(0.0292)	(0.0583)
Trade credit	-0.0369	-0.0687	-0.0498	-0.0703
	(0.0512)	(0.0597)	(0.0458)	(0.0580)
Leasing and factoring	0.155***	0.0337	0.160**	0.0351
	(0.0601)	(0.0395)	(0.0622)	(0.0398)
Bank loans	-1.594***	-0.429***	-1.597***	-0.429***
	(0.0502)	(0.135)	(0.0502)	(0.134)
Other loans	-0.0782	0.293***	-0.0719	0.292***
	(0.0649)	(0.0810)	(0.0674)	(0.0818)
Labor cost change	-0.00389	-0.0893**	-0.00336	-0.0882**
	(0.0208)	(0.0398)	(0.0198)	(0.0401)
Turnover change	-0.000292	-0.0497	0.00153	-0.0495
	(0.0234)	(0.0356)	(0.0233)	(0.0355)
Firms involved in new process development	-0.0429**	0.0436	-0.0455**	0.0417
	(0.0210)	(0.0450)	(0.0218)	(0.0457)
Firms involved in other innovation	-0.0814	0.0698	-0.0776	0.0722*
	(0.0562)	(0.0438)	(0.0571)	(0.0431)
Firms with high growth rate	-0.0849***	0.0817	-0.0920***	0.0823
	(0.0244)	(0.0620)	(0.0246)	(0.0632)
Firms with BA_VC investors	0.106***	-0.00894	0.106***	-0.00612
	(0.0302)	(0.0668)	(0.0299)	(0.0681)
Firms with Bank support	0.0718***	-0.516***	0.0720***	-0.520***
	(0.0262)	(0.0544)	(0.0252)	(0.0535)
Financial Sophistication	-0.000199	0.0236*	0.000664	0.0241*
	(0.00733)	(0.0135)	(0.00724)	(0.0136)
Pressing problems	0.00257	0.00682***	0.00299	0.00667***
	(0.00243)	(0.00207)	(0.00211)	(0.00210)
Firm perception of economic outlook	-0.0621*	0.0904***	-0.0639**	0.0910***
	(0.0319)	(0.0324)	(0.0326)	(0.0323)
Firm creditworthiness	-0.0297	-0.103**	-0.0262	-0.102**
	(0.0413)	(0.0455)	(0.0420)	(0.0457)
General economic outlook	-0.0156	-0.144**	-0.0135	-0.144**
	(0.0174)	(0.0680)	(0.0176)	(0.0685)
Change in GDP	0.0166	0.0296**	0.0166*	0.0304**
	(0.0106)	(0.0136)	(0.00870)	(0.0137)
Demand of credit	-3.337***	0.990***	-3.274***	1.023***
	(0.371)	(0.354)	(0.310)	(0.356)
The firm needs additional short-term finance	-0.126***		-0.128***	
	(0.0381)		(0.0395)	
The firm needs additional long-term finance	-0.539***		-0.540***	
	(0.0303)		(0.0304)	
Constant	2.584***	-1.719*	2.579***	-1.530
	(0.494)	(0.955)	(0.493)	(1.087)
Wave	yes	yes	yes	yes
Observations	18,782	18,782	18,782	18,782
N_clust	27	27	27	27

Sig: *<.10; **<.05 ***<.01; Robust standard errors

Figure 1A

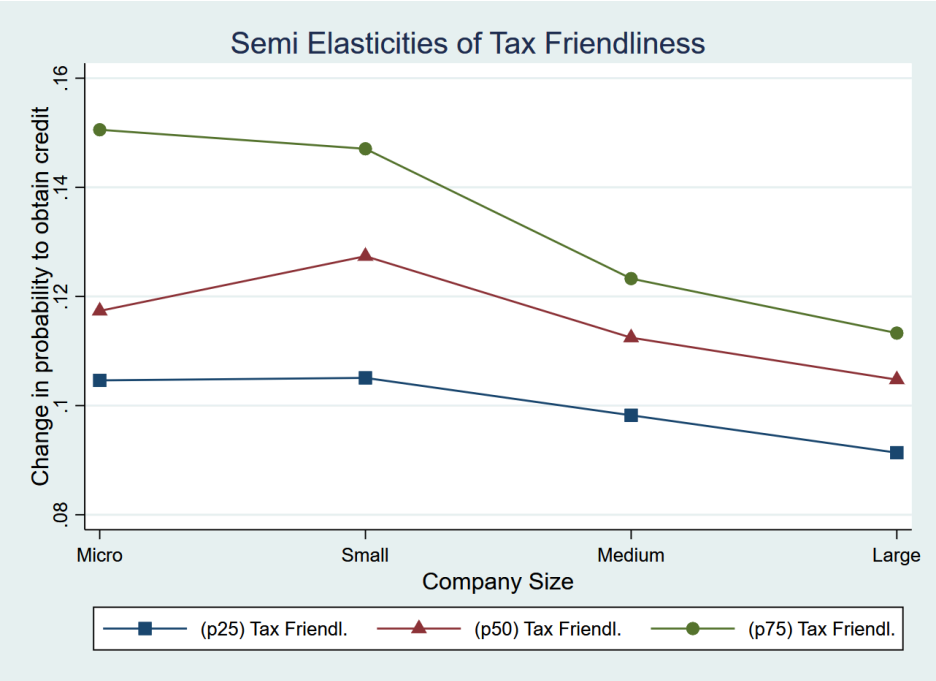


Figure 1B

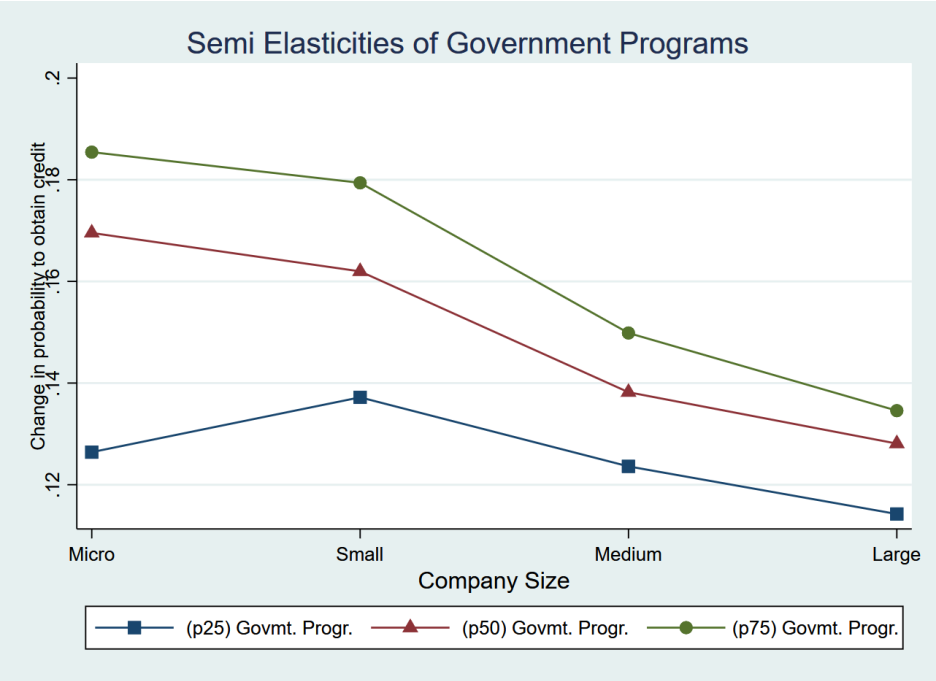


Figure 2A

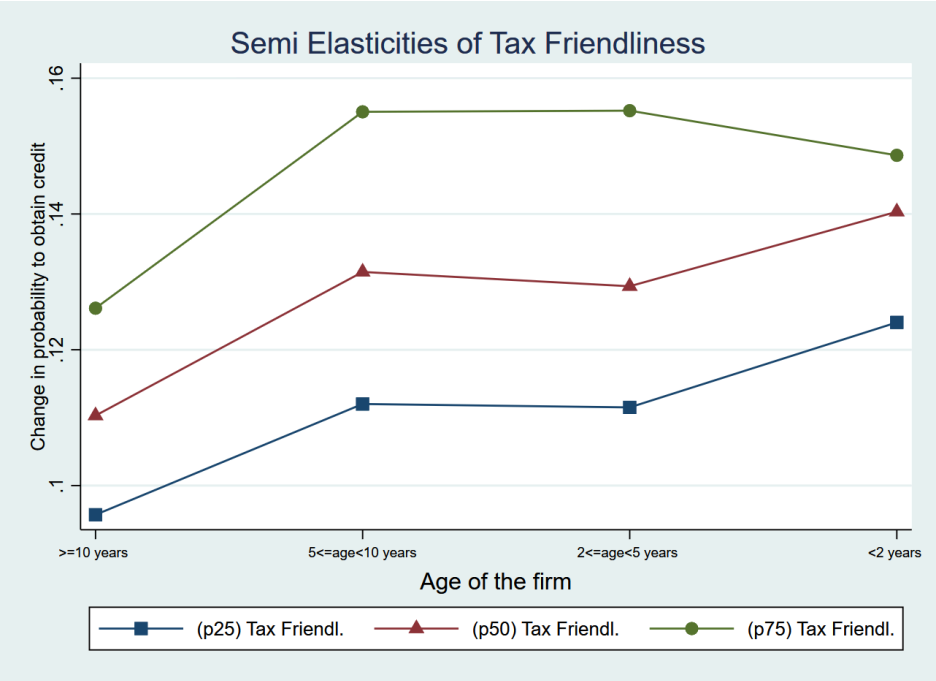


Figure 2B

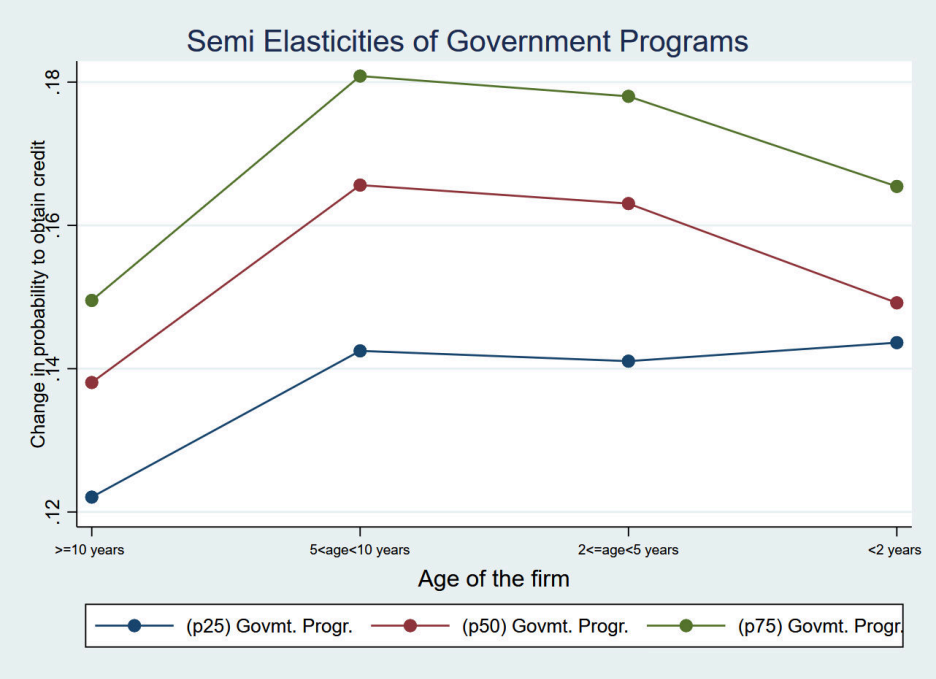


Figure 3A

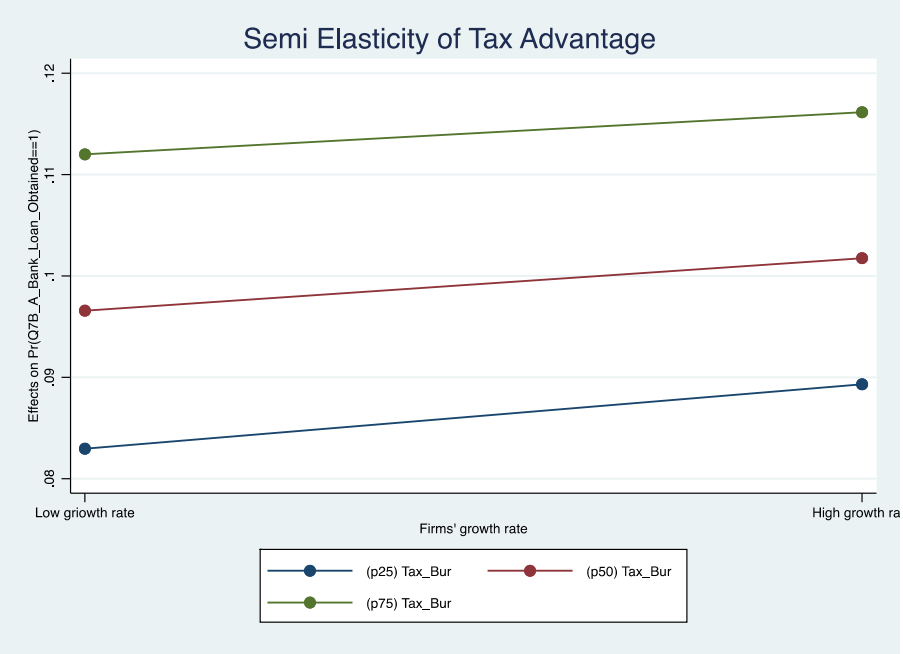


Figure 3B

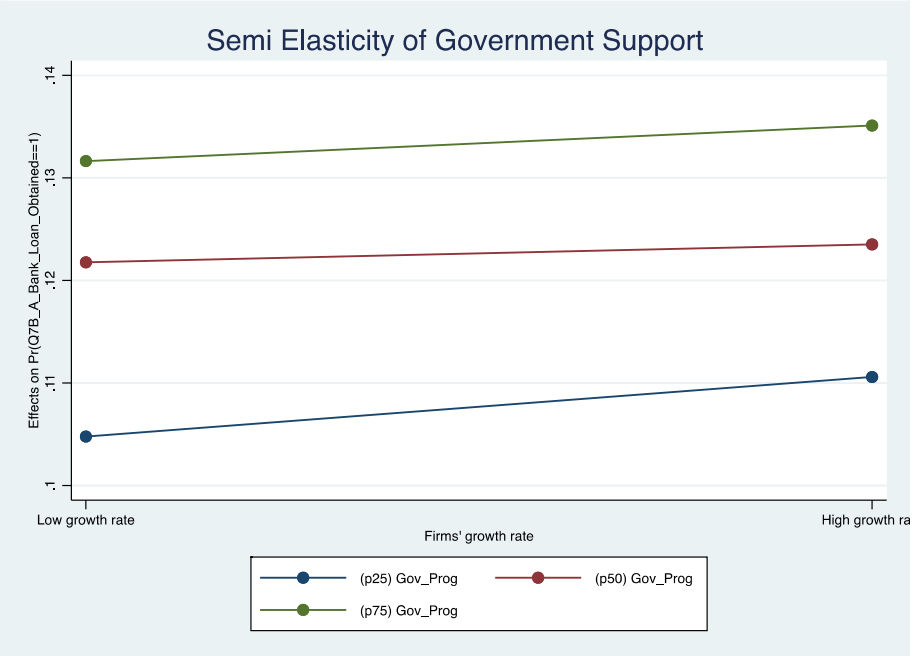


Figure 4A

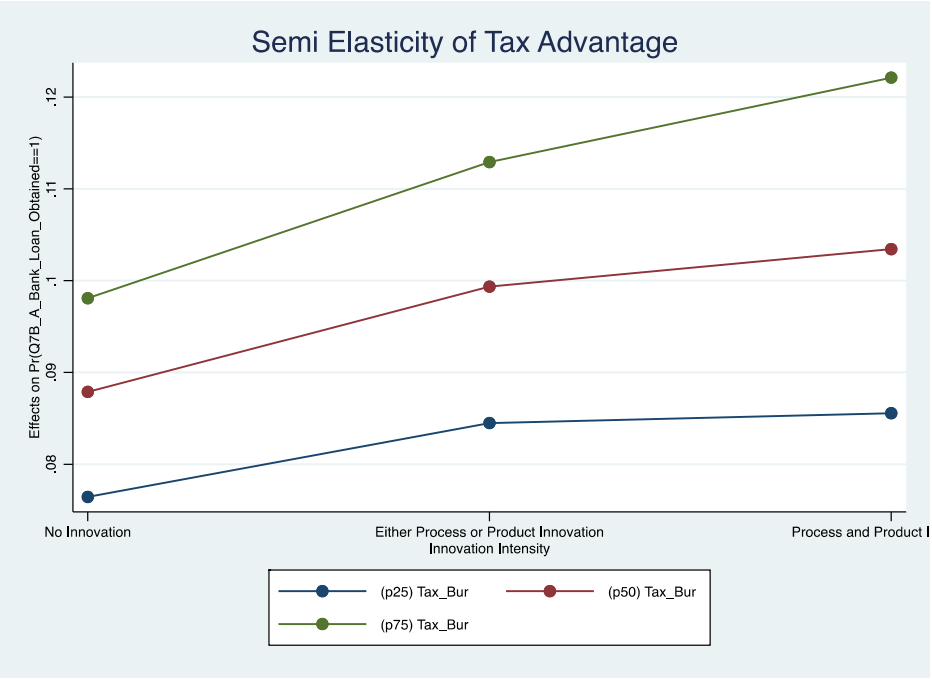
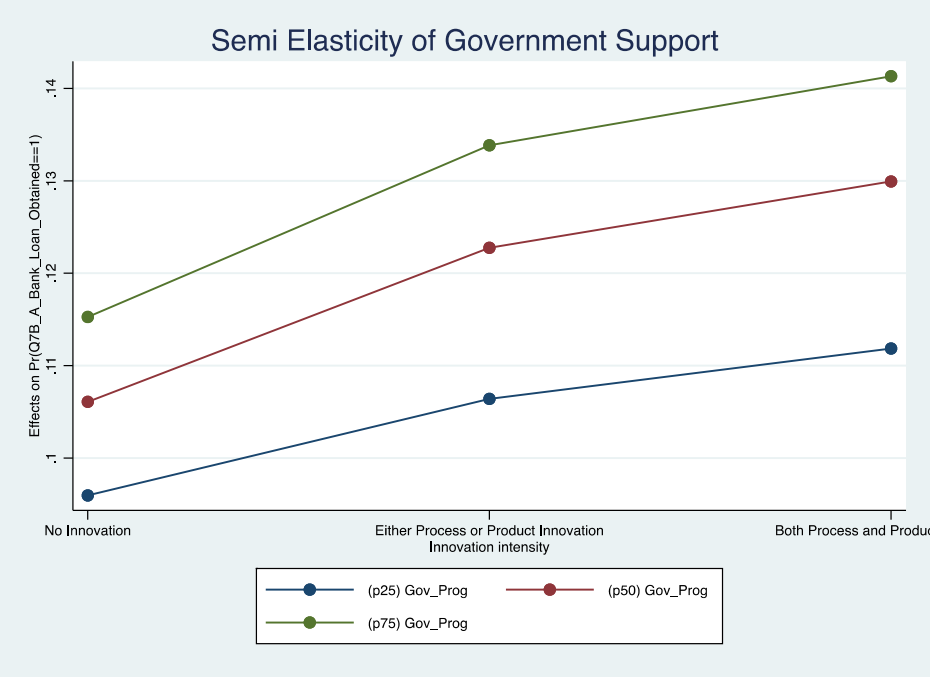


Figure 4B



A1: Two-Stage Residual Inclusion regressions - endogeneity test.

Dependent Variables: *Credit Obtained and Discouraged*

Variables of interest: *Index for tax support to entrepreneurial firms; Index for the government support policies; Debt to GDP ratio, Inflation rate, Debt to GDP ratio residuals and Inflation rate residuals.*

Control Variables (included but not reported): *firm dimension (dummies for micro, small and medium firms); age of the firm (dummy for younger than 2 years, 2–5 years, 5–9 years); Source of funding used (dummy for use of equity, retained earnings, trade credit, leasing/factoring, bank, other); change in the labor costs (increase, stable, decrease); change in turnover (increase, stable, decrease); firm innovativeness in process; firm other innovativeness (use any type of innovation); firm's growth rate (dummy for high-growth-rate firms); Business Angels or Venture Capital involvement (dummy if BA or VC are shareholders of the firm); bank support (dummy about whether the bank is supportive); Firm sophistication (number of alternative sources of finance used), pressing problems (amount of general challenges that the firm is facing); Firm's perceived economic outlook; Firm creditworthiness; Bank perceived economic outlook; Economic outlook (change in the GDP); Demand for credit (as a ratio of the firms demanding credit among all firms); Firm's short-term credit needs; firm's long-term credit needs)*

	(1)	(2)	(3)	(4)
VARIABLES	Obtain Credit Model GEM - Tax advantage	Obtain Credit Model GEM - Government support for entrepreneurship	Discouraged Borrowers Model GEM - Government support for entrepreneurship	Discouraged Borrowers Model Government support for entrepreneurship
GEM - tax burden for entrepreneurial firms	***173.6******		***-80.60******	
	(14.27)		***(3.628)***	
GEM - Government support for entrepreneurship		***79.42******		***-69.13******
		(5.517)		***(4.354)***
Debt_GDP	0.00276	0.000199	0.00337	0.00357
	(0.00337)	(0.00250)	(0.00256)	(0.0177)
Inflation rate (year)	-0.0329	0.0932	-0.0278	0.0219
	(0.154)	(0.0830)	(0.0708)	(0.0533)
Tax advantage_residuals	-173.6***		80.66***	
	(14.24)		(3.711)	
Gov Support_residuals		-79.20***		69.36***
		(5.501)		(4.343)
Constant	-488.7***	-231.7***	218.8***	194.4***
	(40.42)	(15.76)	(10.07)	(12.34)
Wave	Yes	Yes	Yes	yes
Controls	Yes	Yes	Yes	yes
Observations	6,634	6,634	12,148	12,148
r2_p	0.950	0.821	0.611	0.716
N_clust	27	27	27	27

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1